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Nigeria Rice Value Chain Analysis



October 2012

This publication was produced for review by the United States Agency for International Development. It was prepared by Chemonics International Inc.

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MARKETS II

DRAFT

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Contents

Acronyms.....	5
Executive summary.....	6
The Rice Sector	6
Setting the Scene.....	8
Feeding Africa.....	8
Nigeria's Trade Patterns.....	9
Chapter A: The Context	11
1. Global Context	11
2. Regional Context	12
3. The Current Situation in West Africa	13
4. Policies	14
5. The Impact of Tariffs and other Policy Instruments	14
6. Nigerian Context	14
7. Recent Policy Changes.....	15
Chapter B: Rice Value Chain	17
1. Cluster Map	17
2. Crop Budget and Waterfall Diagram	17
3. Value Chain Survey	18
4. Processor characteristics.....	22
Chapter C: Choices.....	24
Chapter D: Conclusions and actions	26
Annex I: Survey methodology	28
Annex II: Case Studies – False Bottom Drums and Wet Season Paddy.....	30
Annex III: Source of growth.....	32

Acronyms

ATA	Agricultural Transformation Agenda
GON	Government of Nigeria
IRRI	International Rice Research Institute
mt	metric ton
Mt	million metric tons
NAEC	National Agricultural Enterprise Curriculum
NASC	National Agricultural Seed Council
NCRI	National Cereal Research Institute
WARDA	West Africa Rice Authority (Africa Rice)

Executive summary

The MARKETS II project began in late April 2012 with the objective to increase the competitiveness of selected agricultural commodity value chains by strengthening linkages between value chain actors, improving access to inputs and finance, deploying and disseminating technologies to new users, and by building the capacity of all value chain actors through technical assistance.

MARKETS II builds off the success of the MARKETS (2005 – 2010) and Bridge to MARKETS II (2011 – 2012) projects. It is designed to go deeper in fewer value chains (four to five), and achieve greater impact. Furthermore, MARKETS II is expected to concentrate its efforts in up to ten key states. By concentrating its resources on a reduced number of value chains and states, USAID will be better able to assess its impact on targeted value chains and beneficiaries.

In May 2012, a number of selection criteria were developed to select value chains for further analysis. These criteria included low-entry threshold for women, youth, and vulnerable groups; the geographical spread of the commodity; the importance of the commodity in the GON Agricultural Transformation Agenda; the possibility of deploying new, low-cost technologies; and whether the commodity falls within the MARKETS II smallholder farmer mandate.

Based on this selection process, the following value chains were selected for further analysis: cassava, sorghum, rice, cocoa, and aquaculture. Maize and soybean were also selected as they are the main ingredients of fish feed, and the lack of quality fish feed is one of the primary constraints of the aquaculture value chain.

Teams of MARKETS II staff and locally hired value chain experts conducted field research using questionnaires with key informants and holding open ended focus group discussions with a large number of stakeholders including producers, processors, traders, input suppliers, service providers, and policy makers.¹

A series of half day validation work shops were organized with participation of a cross-section of the stakeholders surveyed. The methodology is described in further detail in Annex II.

The Rice Sector

Rice is a major food staple, the mainstay for household food security for nearly half the world's population, and is mainly cultivated by smallholder farmers on plots of less than one hectare. Rice is of special importance for the diet of large parts of the population in Asia, parts of Latin America, and increasingly in Africa. In many countries rice is considered a "strategic" commodity and subject to a wide range of government controls and regulations.

The common form of rice, *Oryza sativa*, has two major subspecies: Indica, or long grain rice, with a wide adaptability to different environments, and Japonica, round grain rice, strongly responsive to fertilizer application. Japonica accounts for 13 percent of the world's production, while the bulk is made up of Indica.²

¹ A detailed description of the survey methodology can be found in Annex 1.

² New Rice for Africa (NERICA) is a hybrid cross between *Oryza sativa* and *Oryza glabberima*, or African rice.

Rice production takes place in four broadly defined ecosystems: (1) irrigated, (2) rain-fed lowland with water control, (3) upland, solely relying on rainfall, and (4) flood-prone, deep-water rice grown in swamps and mangroves. According to estimates by the International Rice Research Institute (IRRI), irrigated rice accounts for 50 percent of global production, while rain-fed lowland rice accounts for 35 percent and upland rice for nine percent. Considering the rising costs of irrigation, growing competition for water resources, and the loss of land to urbanization, future growth in rice production will most likely come from lowland rain-fed ecosystems, and, to a lesser extent, from upland ecosystems.

Most rice is consumed in the countries where it is produced, which means that the global trade in rice, estimated at 27 million metric tons, or seven percent of global production, is relatively small in comparison with other commodities. For instance, these figures represent roughly one-quarter of the international trade in wheat and one-third that of maize.

Nigeria is an important producer of rice, with production at 2.8 million metric tons. Consumption, however, far outstrips production, and Nigeria imports an additional two million metric tons annually to make up the shortfall. At current market prices this represents somewhere between \$880 million and \$1.1 billion dollars.

The Government of Nigeria (GON) launched the Agricultural Transformation Agenda (ATA) in 2012 with the main goal of making Nigeria self-sufficient in rice production by 2015. The ATA will be supported by increased tariffs on imported rice, the importation of 100 new rice mills to be operated by the private sector, and the formation of production clusters around these new mills for paddy production.

During the rice value chain survey validation workshop, attended by a cross section of surveyed stakeholders, several strategic priorities for MARKETS II were formulated:

- Availability in sufficient quantities for local use of suitable seed varieties that produce rice which can compete with imported long grain rice of desired uniformity
- Develop innovative downstream distribution systems for agricultural inputs
- Engage youth in rice farming or services to rice producers
- Promote dry season rice production
- Provide support to existing and emerging rice processors
- Facilitate the introduction, adoption and local manufacturing of small scale mechanization

Setting the Scene

Feeding Africa

The world food crisis in 2007-08, during which food prices experienced their sharpest rise in 30 years, leading to food riots in many parts of the world, focused global attention on the importance of agriculture. After decades of neglect, investment in agriculture is now on the rise. A notable example in Sub-Saharan Africa is Malawi, which spent as much as 4.2 percent of its GDP on a fertilizer subsidy scheme that moved the country from being a net importer of grain to an exporter to the region. Unfortunately, the amount of the subsidy was not one Malawi could sustain in the long run.

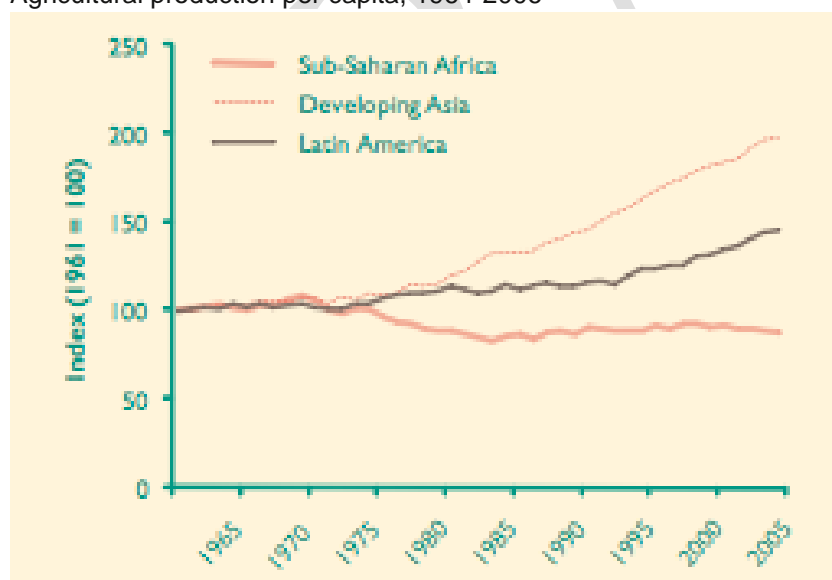
The Food and Agriculture Organization estimates that to keep pace with demand, developing countries will have to double food output by 2050. This amounts to a 70 percent rise in food production.

While the situation has temporarily eased, fundamental issues have not gone away. At the heart of the developing world's agricultural challenge is the basic issue that demand is rising faster than supply can keep up.

Population growth, urbanization, and increasing incomes are leading to a shift in consumption from grains to meat in developing countries, requiring greater grain production for feed. In parallel, demand for biofuels is consuming more of the grain production from the large grain exporting countries. On the supply side, land under cultivation has increased but is nearing saturation, and yield growth in cereals is declining, from three to six percent a year levels during the Green Revolution in the 1960s to nearer one to two percent today. In some developing countries, yields are flat.

Not even flat

Agricultural production per capita, 1964-2006



Since 1960, output in Africa has increased by 2.4%, while its population has grown at a rate of 2.6%, resulting in food aid requirements that are 4 times higher than other regions.

Source: The Economist; "Whatever happened to the food crisis"; June 2009

The Challenge According to Sachs

Writing about the state of agriculture in Africa, economist Jeffery Sachs summarizes the challenge and solutions:

“...many poor countries’...farmers are producing far below what is technologically possible.”

“Traditional farming uses few inputs and gets poor yields. Poor peasants use their own seeds from the preceding season, lack fertilizer, depend on rain rather than irrigation, and have little if any mechanization beyond a traditional hoe. Their farms are small, perhaps one hectare (2.5 acres) or less. Under traditional agricultural conditions, the yields of grain – rice, wheat, maize, sorghum, or millet – are usually around one ton per hectare, for one planting season per year.”

The key: “There is nothing magic about [a] combination of high-yield seeds, fertilizer, and small-scale irrigation.”

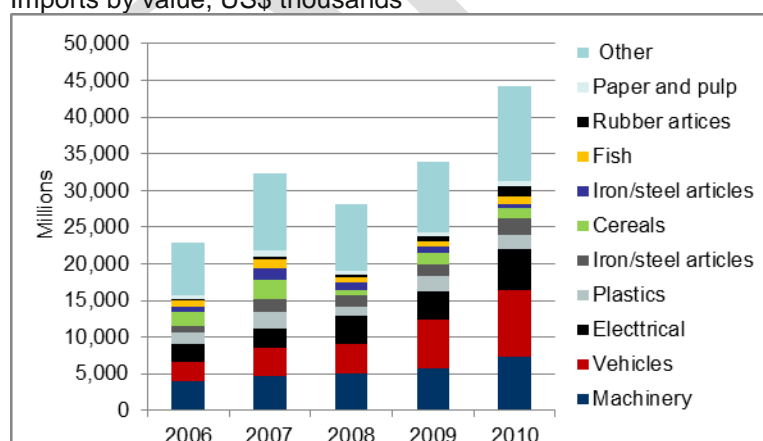
Nigeria’s Trade Patterns

Nigeria’s import base is expectedly diverse, as are its trading partners. While manufactured goods dominate its imports, food products – namely cereals and fish – also feature in its top 10 imports. Import substitution is therefore seen by policy makers as a driver toward achieving self-sufficiency in key agricultural commodities.

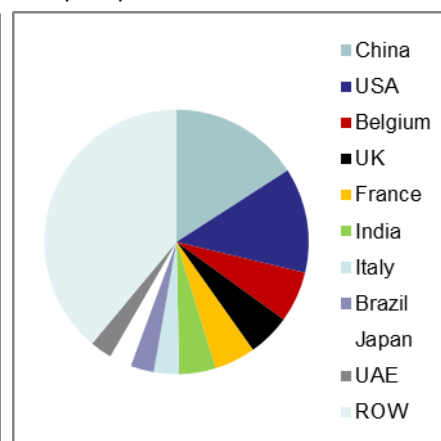
Oil is king, dominating Nigeria’s exports, enabling the country to run a trade surplus. If one excludes oil, this picture changes dramatically, with imports dwarfing Nigeria’s non-oil exports. Non-oil exports are indeed growing fast, at a rate of 80 percent a year, albeit from a negligible base, as Nigeria diversifies its economy away from dependence on oil.

Top 10 imports

Imports by value, US\$ thousands



Import partners, share of value



Source: ITC data, MARKETS II analysis.

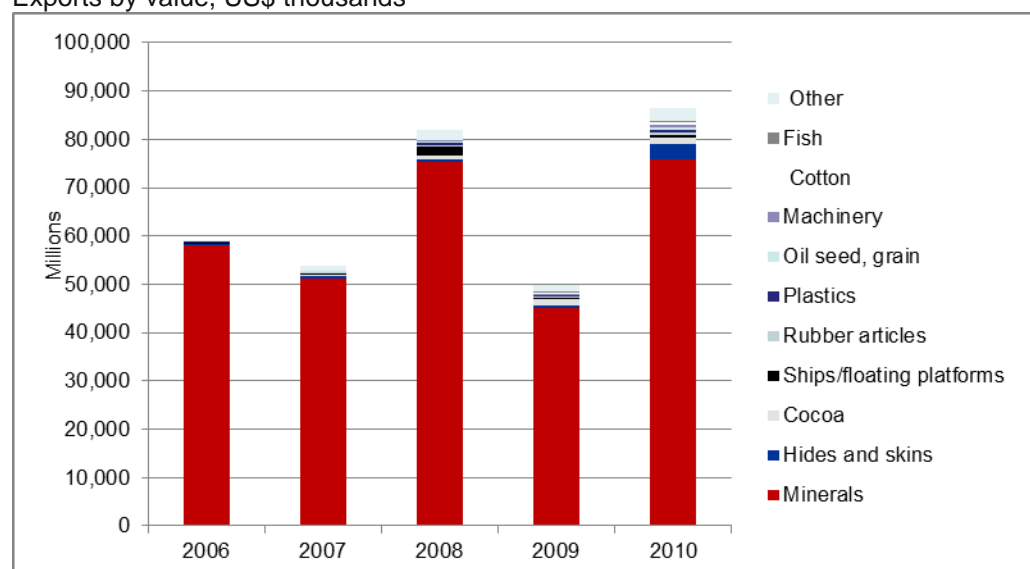
A study that looked at the drivers of Nigeria’s growth compared with other African oil producers showed that oil accounted for only 35 percent of the country’s growth between 2002-07, compared to 86 percent for Angola. Agriculture accounted for an encouraging 27 percent of Nigeria’s growth, and services for 37 percent. However, manufacturing accounted

for a paltry one percent of total growth, which is concerning for the agricultural processing sector. The factors that are inhibiting the growth of the manufacturing sector in Nigeria will similarly affect agricultural processors, from the erratic availability of power to the high costs of transportation.

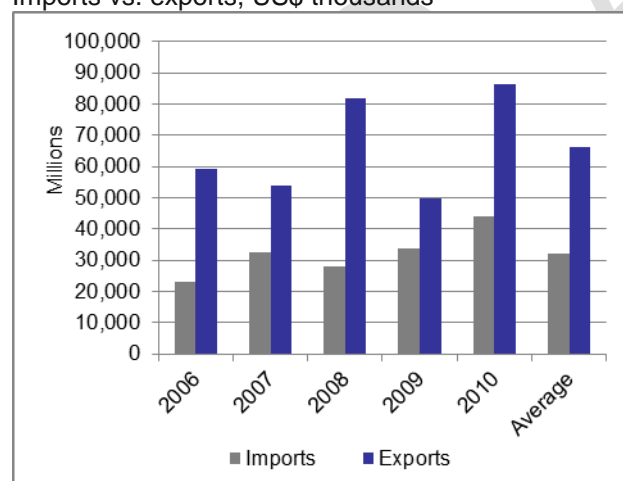
McKinsey Global Institute, World Bank Development Indicators in *Lions on the move: The progress and potential of African economies*, June 2010, p. 31.

Top 10 Nigerian exports

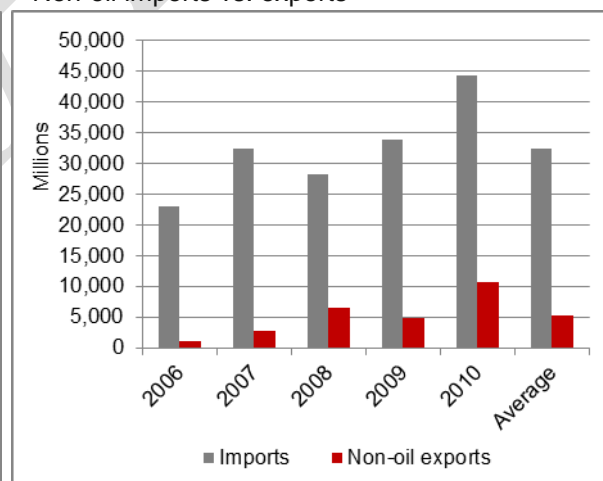
Exports by value, US\$ thousands



Imports vs. exports, US\$ thousands



Non-oil imports vs. exports

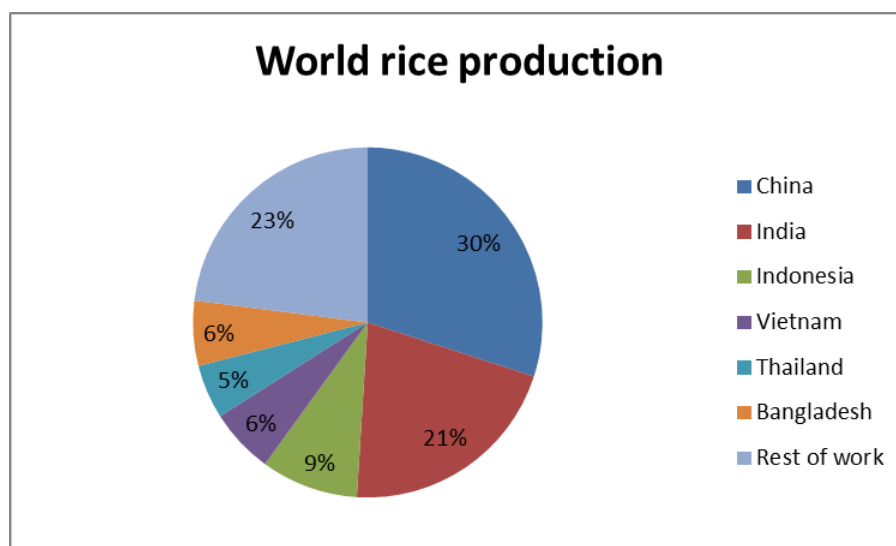


Source: ITC data, MARKETS II analysis.

Chapter A: The Context

1. Global Context

Although rice is grown in many countries in both the Northern and Southern Hemispheres, two countries—China and India—dominate global production with 53 percent of the cultivated area.



Revised output data on the 2011 season put global production at a new record of 723.1 Mt (482.3 Mt on a milled basis), three percent over the previous record of 2010. Forecasts for 2012 have been slightly lowered due to deteriorating crop prospects in Asia and the potential impact of an El Niño event in late 2012. However, even with these possible negative impacts, FAO still expects a global output of 724.5 Mt, or slightly over the 2011 record harvest.

Rice is predominantly consumed in the countries where it is produced, and international trade, estimated at 27 Mt, is small compared to other commodities such as wheat and maize. It is growing, however, at two percent per year and is expected to reach 35 Mt by 2015. The world's main exporting countries are Thailand (29 percent), Vietnam (15 percent), and India (15 percent).³

World rice prices as of in September 2012 are stable or even decreasing thanks to increased production and high inventory levels. Thai 5% broken traded in October 2012 at \$550/mt, Vietnam 5% broken at \$440/ mt.^{4, 5}

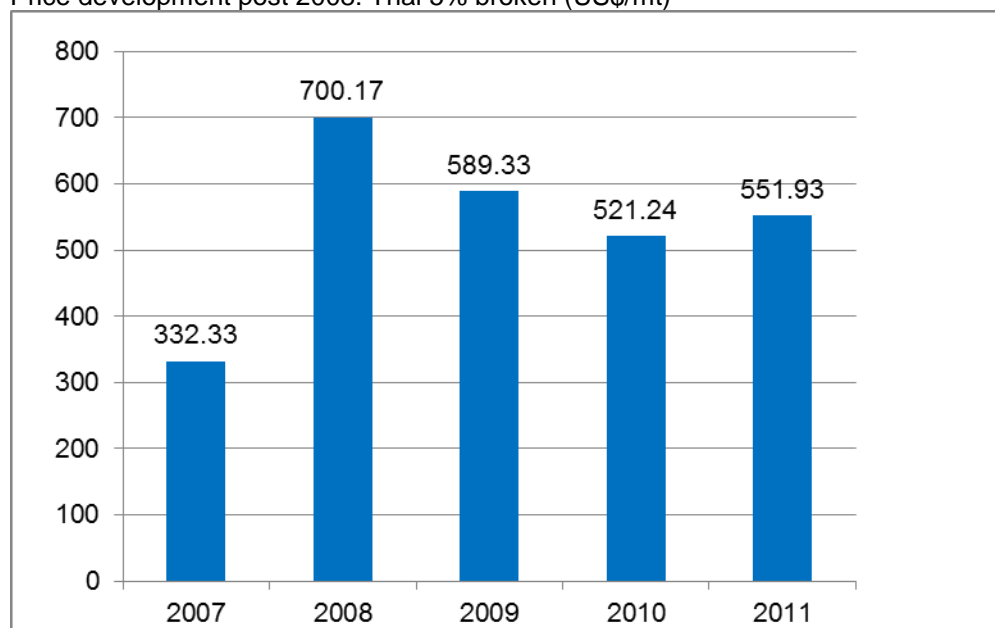
The following graph shows the price development during the 2008 food crisis that led to civil unrest in many countries around the world. Although rice prices have come down from their 2008 high, they are still well above the 2007 levels.

³ FAOSTAT, 2005 data.

⁴ ORYZA daily bulletins

⁵ Due to local preferences, the international rice market is very fragmented and divided in several sub-markets depending on varieties (Japonica or Indica, fragrant), quality (depending mainly on the percentage broken) and stages of processing (paddy, husked, milled).

Price development post 2008: Thai 5% broken (US\$/mt)

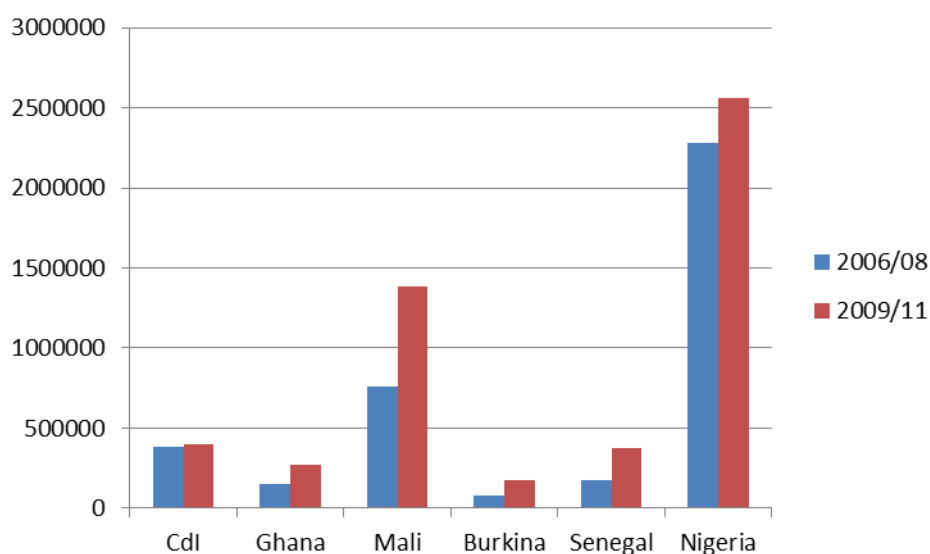


2. Regional Context

Between 2001 and 2005, rice production in West Africa increased at an average annual rate of 5.06 percent, while consumption during this period rose by 6.55 percent (WARDA). Approximately 95 percent of the increased production is from extensification, suggesting little growth in farm productivity.

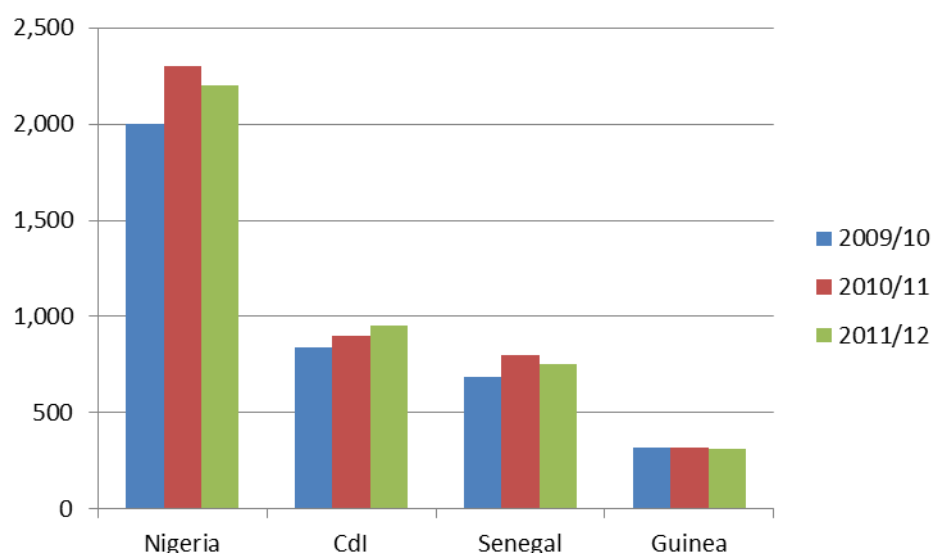
After the 2008 food crisis, rice production increased rapidly in several countries and doubled in countries like Senegal and Burkina Faso. Consumption, however, increased at the same time between 30 percent and 40 percent, leaving a substantial and growing deficit that continues to be met by imports.

Rice production trends West Africa



The West Africa region depends on imports for some 40 percent of its rice supply, with Thailand and Vietnam being the main suppliers. The main importing countries are Nigeria, Benin, Senegal, and Côte d'Ivoire. As a region, West Africa imports over five Mt, or 20 percent of globally traded rice, which represents at October 2012 prices a monetary value of between \$2.2 billion and 2.8 billion.

Rice import trends in West Africa



Rice consumption is especially high in the coastal countries, such as Guinea, Guinea-Bissau, Liberia, and Sierra Leone, all in which the per capita consumption is over 60 kg per year per person and constitutes a large portion of the overall food intake in resource-poor households. Increased consumption is further driven by increased urbanization and greater numbers of women working outside the household—necessitating meals that are easier and quicker to prepare.

3. The Current Situation in West Africa

With poor rainfall patterns impacting production, the USDA estimates that regional production (Nigeria excepted) for the 2011/12 marketing year (MY) will be 13 percent lower compared to 2010/11. As a consequence, imports are estimated to rise by eight percent, partly covering the decline in production. If normal rain patterns return for the 2012/13 season output is expected to bounce back strongly and consumption patterns resume their annual five percent increase rate.

West Africa milled rice production, USDA estimates (in mt)

	2010/11	2011/12	2012/13 (forecast)
Burkina Faso	178,000	157,000	220,000
Cote d'Ivoire	470,000	456,000	500,000
Guinea-Conakry	1,056,000	1,098	1,152,000
Mali	1,500,000	1,132,000	1,500,000
Senegal	411,000	300,000	375,000
Nigeria	2,615,000	2,709,000	2,850,000

4. Policies

Across the region, governments continue to encourage increased local rice production to lessen import dependency and save foreign currency.

In **Senegal**, donor led efforts are underway in the Senegal River Valley to rehabilitate irrigation schemes and provide inputs such as seeds and fertilizer. Donor-led efforts are expected to lead to improved linkages in the value chain between producers, distributors, and retailers.

In **Côte d'Ivoire**, efforts are have begun to increase national production by 200,000 mt through the provision of seeds and fertilizers and irrigation.

Mali aspires to increase production to 2.7 Mt by 2013 and 3.8 Mt by 2018 to serve national and regional markets.⁶

In Senegal import tariffs vary from 10 to 37 percent, Ivory Coast has a uniform import tariff of five percent while Nigeria raised its tariffs in May 2012 to 50 percent for milled white rice and 30 percent for brown rice.

5. The Impact of Tariffs and other Policy Instruments

All West African countries have tried tariffs and other policy instruments over the past decades to stimulate domestic production and consumption of locally produced rice. These measures have varied from outright import or export bans to high import tariffs—at one time Nigeria's import tariff was 150 percent—to input subsidies for local rice farmers and millers. In spite of these measures, rice imports continue to increase in the region as a whole, and the effect of these measures has been minimal.

Indeed, the competitiveness of local rice does not depend solely on the cost efficiency of the rice producer. It is also adversely affected by poor post-harvest handling and milling operations that lead to lower quality, locally produced rice lacking the homogeneity and cleanliness of imported rice. Without these latter characteristics, consumers are unwilling to pay high prices for locally produced rice, preferring instead to purchase clean and well-packaged imported rice.⁷

6. Nigerian Context

Rice is cultivated in virtually all agro-ecological zones of Nigeria, from the swamps and mangroves of the Niger Delta coastal areas to the dry zones of the Sahel.

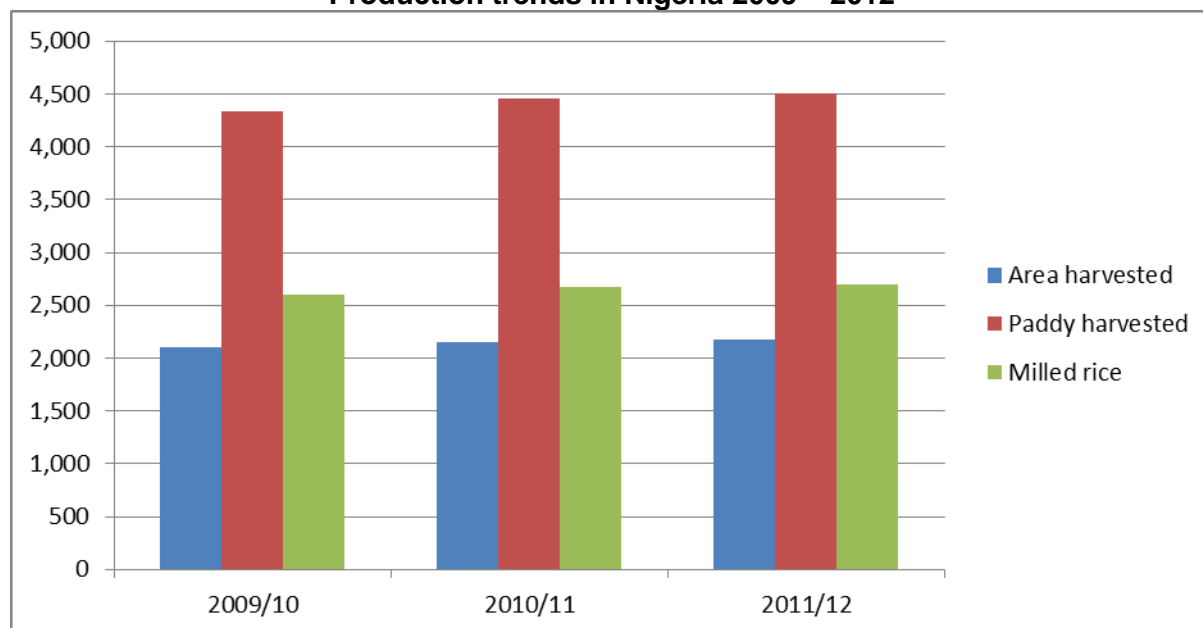
Rice production systems include rain-fed lowland (50 percent), rain-fed upland (30 percent), irrigated lowland (16 percent) and deep water and mangrove rice.

In the 1960s, rice cultivation was below 150,000 hectares with an output of less than 300,000 mt. By 2011, rice cultivation increased to 2.17 million hectares with an estimated output of 2.7 Mt on a milled basis. In spite of this increase in production, Nigerian rice consumption still far outstrips its production, resulting in imports of 2.5 Mt of rice per annum.

⁶ The future of a Libyan-funded, 100,000 hectare irrigated rice farm in Mali is unsure following the change of regimes in that country.

⁷ Lancon, F. et al. *Rice imports in West Africa: trade regimes and food policy formulation*. Montpellier, 2007.

Production trends in Nigeria 2009 – 2012



Source: USDA Grain Report 2012

7. Recent Policy Changes

In May 2012, the GON published the Agricultural Transformation Agenda (ATA), part of which included GON's intention to make Nigeria self-sufficient in rice by 2015, when the ATA foresees domestic rice production of seven Mt per annum. Also in May 2012, the GON increased the import tariff on white rice by nine percentage points to 50 percent and on brown rice to 30 percent. Rice import tariffs are based on a flat price for rice of \$699, regardless of what the importer pays, which means that importers pay a tariff of \$349.50 per mt on top of the price for the rice itself.

The following table illustrates the landed cost of a 50 kg bag of imported Thai 5 % broken, taking the average September 2012 price and applying the new tariff that was introduced in May 2012 by the GoN. It is interesting to note that the landed price of imported rice is very close to the retail price of milled local rice. Ebony Agro for instance sells 50 kg of parboiled rice for Naira 8,300.

Landed cost of imported rice (Thai 5%, end September price).⁸

FOB Thailand	\$/mt	\$ 550	
C&F Lagos		\$ 600	
Custom valuation	\$ 699		
Duty 50%	\$ 349.50		
Total		\$ 949.50	
Other charges	\$ 80	\$ 1029.50	
Total landed cost in Naira			N 162,661.00
Landed cost 50 kg bag			N 8,133.05

⁸ Thai 5% broken is taken as the benchmark but in reality Nigeria imports cheaper Thai 20 percent broken or rice from India and Vietnam which in September 2012 was about \$100/mt cheaper than Thai rice.

Other supportive actions of the ATA are the importation of over 100 Chinese rice mills that will be operated by the private sector, as well as the formation of production clusters around these new mills. The first 40 mills are expected to be operational by 2013.

Agricultural Financial Services: A Crosscutting Activity

Nigeria's agricultural sector lacks adequate capital at every level: too little investment in processing, limited working capital for intermediaries, and few appropriate financial products, such as leasing and smallholder credit, to address farmers' needs. At the same time support to Nigeria's financial institutions has been substantial, with loan guarantee funds and credit schemes from Central Bank of Nigeria (CBN) and other donors.

The biggest challenge stakeholders face when trying to access credit is the inability of financial institutions to provide credit at the producer level. From the banks' perspective, producers are unorganized and transaction costs are high. Even when adopting a value chain approach to finance, banks and processors face side selling by farmers which can result in loan defaults.

Challenges

The main challenges in agricultural finance can be summarized as follows:

- Record-keeping by small-scale farmers is rare. This limits the ability of commercial bank staff to analyze the profitability of prospective loans.
- Banks believe agricultural lending is risky and unprofitable.
- Most commercial bank staff do not understand agricultural lending. They knowledge from conventional banking to agricultural lending, leading to problems such as approving loans after the agricultural season is nearly over.
- Smallholder farmers tend to be unorganized and lack group cohesion to access credit from lending institutions.
- Agreements between farmers, buyers and banks are not respected by all parties, resulting in a breakdown in trust and inefficiencies in the value chain.

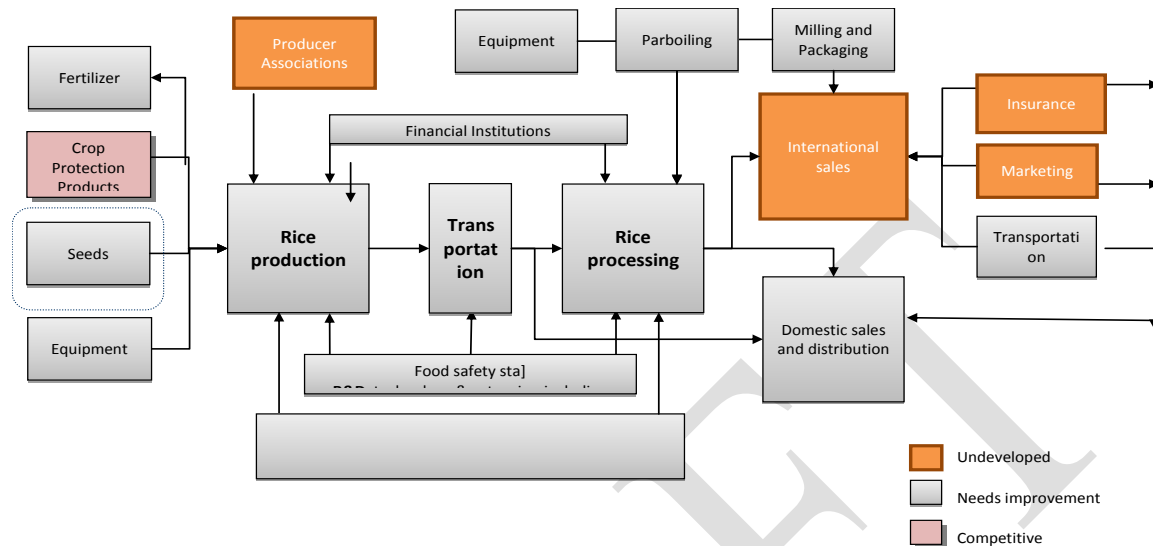
Solutions

The challenges in agricultural finance are many, and so the solutions are complex. Some ideas for where to focus efforts include:

- Build farmer capacity for basic record keeping and business skills.
- Train commercial bank staff on agricultural lending, including crop cycles, cost of production, risk management and profitability models.
- Support farmer group formation and train on group dynamics and the benefits of membership.
- Support understanding of the advantages of pricing and off-take arrangements between farmers and processors, and the long-run benefits of honoring contracts.
- Support development of standard warehousing arrangements and a regulated commodity exchange.
- Support deregulation of crop and other agricultural insurance.
- Support the rollout of the Nigerian Incentive Risk Sharing Agricultural Lending (NIRSAL), CBN's new strategic new guarantee mechanism.
- Strengthen private sector distribution of inputs, with oversight and regulation by the government.

Chapter B: Rice Value Chain

1. Cluster Map



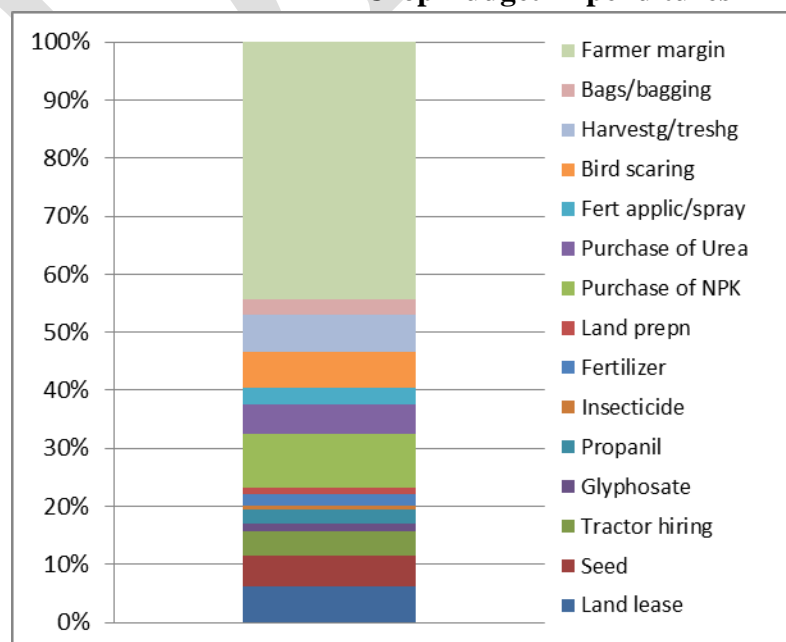
Source: Rice value chain group, "MARKETS II draft rice value-chain map, 2012.

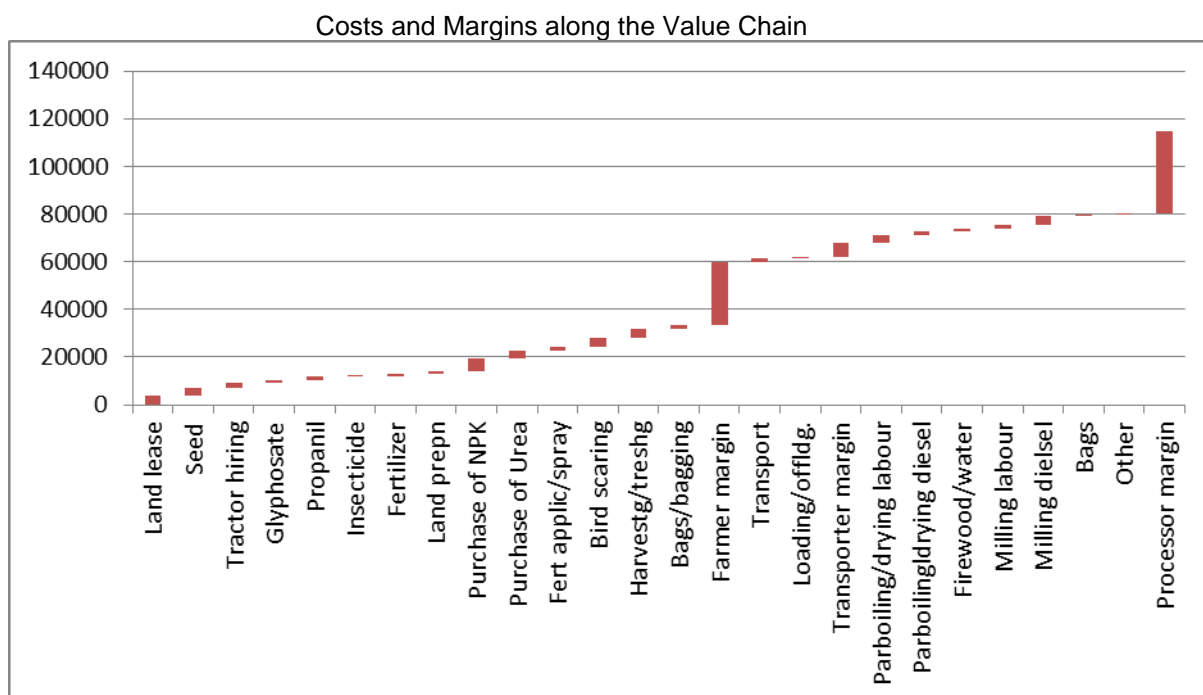
Rice Value chain dynamics

2. Crop Budget and Waterfall Diagram

From the survey data, we were able to construct a crop budget chart which shows a healthy margin for the farmer. Surprising are the relatively high cost for bird scaring and the cost of NPK fertilizer.

Crop Budget Expenditures

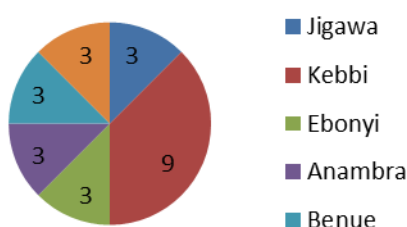




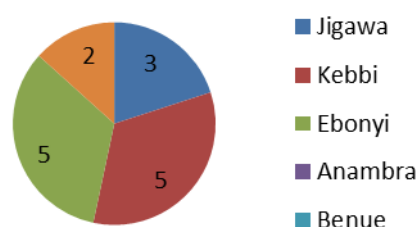
Further analysis of data from other value chain players (transporters, parboilers. and millers) enabled us to construct the above waterfall diagram indicating the different costs and margins along the value chain. It is clear that both farmers and processors make decent margins.

3. Value Chain Survey

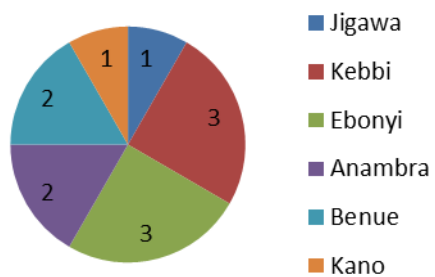
The rice value chain survey covered interviews with 80 stakeholders in seven states using structured questionnaires. In addition, four Focus Group Discussions involving 30 rice producers were conducted.



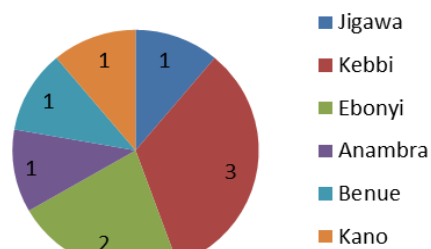
Rice producers



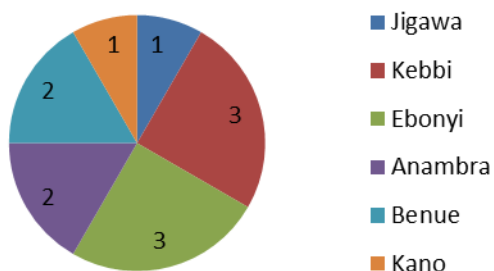
Rice processors



Input dealers



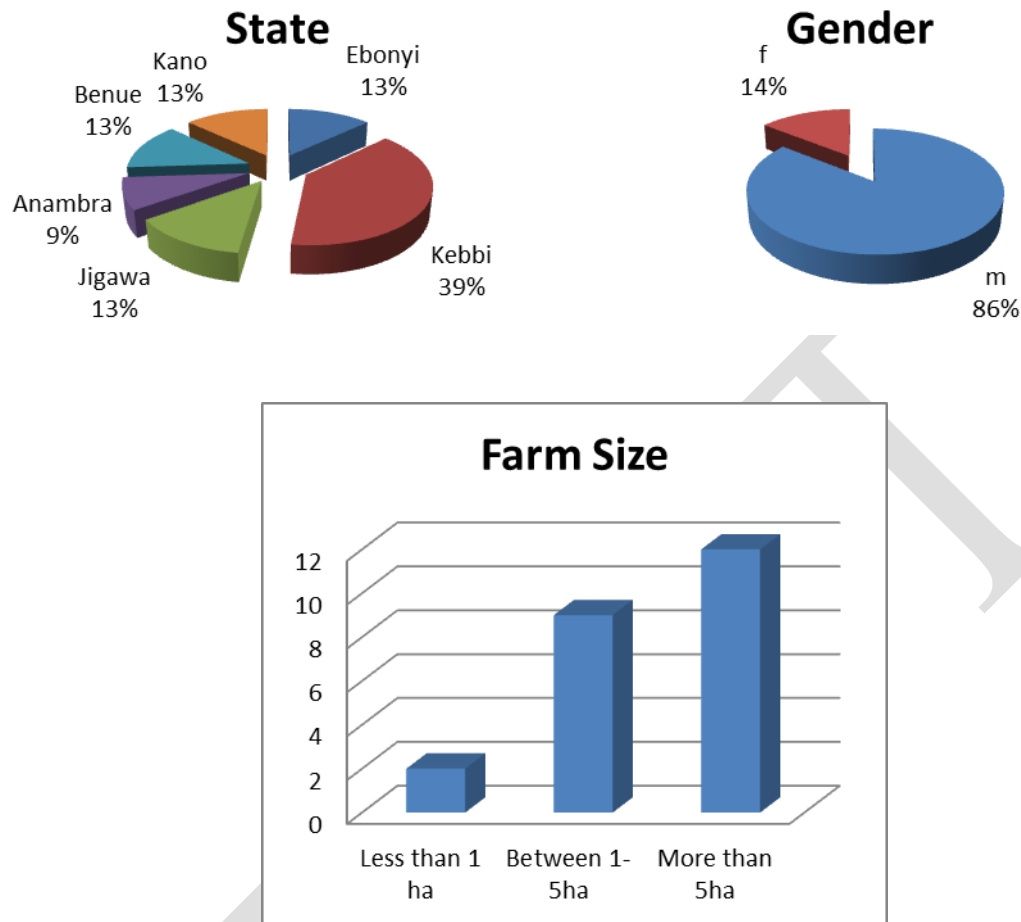
Policy makers



Service providers

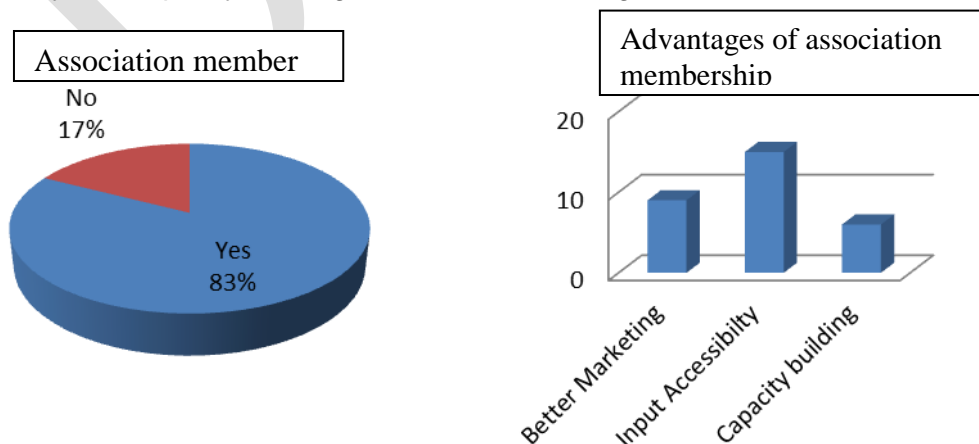
Producer characteristics

A total of 24 farmers were interviewed in six states. The majority of the farmers were male.

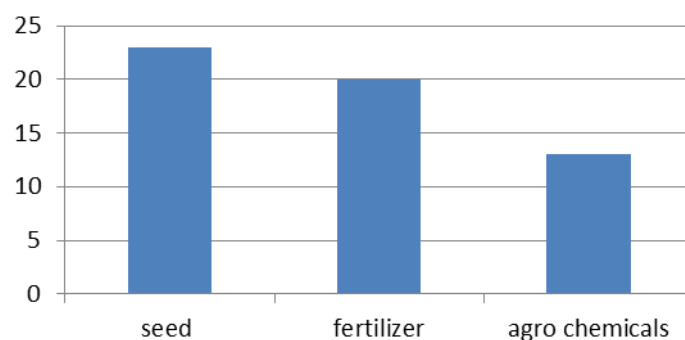


Most of the farmers in the Northern states of Jigawa, Kebbi, and Kano reported farm sizes of more than 5 hectares.

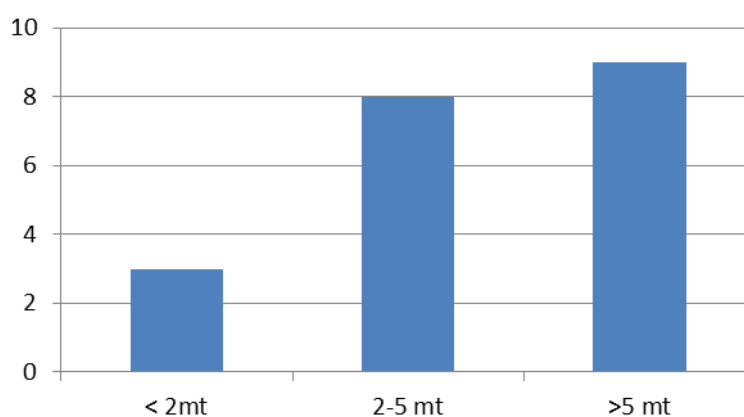
Most of the farmers interviewed are members of farmer groups or cooperatives and specified the benefits in terms of marketing (especially if the group is linked to a rice mill), input accessibility and capacity building in the form of training.



All interviewed farmers purchased or obtained improved varieties of seed. Twenty farmers purchased fertilizer and 13 farmers purchased agro chemicals

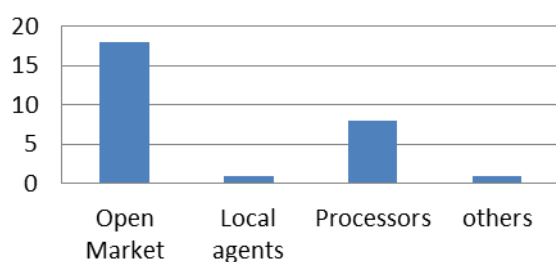


When asked about yields per hectare, only three farmers reported yields below two metric tons per hectare. Eight farmers reported yields between 2 and 5 mt, and nine farmers reported yields of over 5 mt/ha.

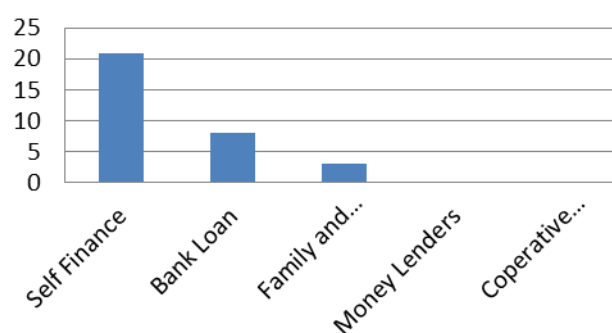


The majority of the farmers sell their harvest in the open market, followed by sales directly to rice mills.

Where do you sell your products

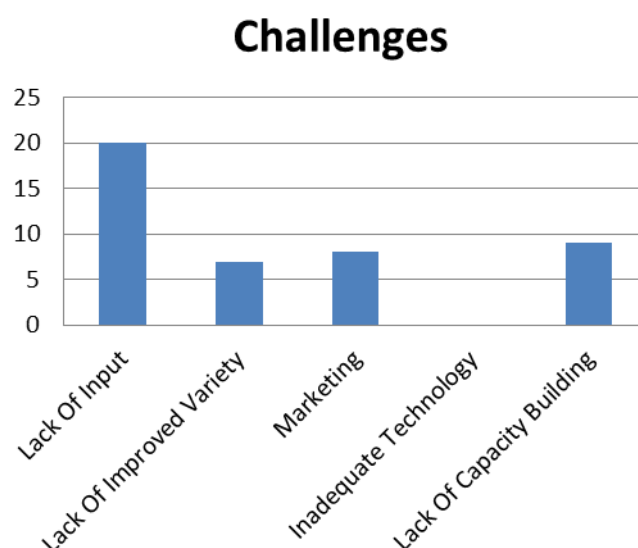


Finance Source



For financing crop production, as shown above, the majority of farmers rely on their own resources and assistance from family and friends.

Many youth and females are employed during the crop cycle doing different tasks such as weeding, transplanting, harvesting, and threshing.



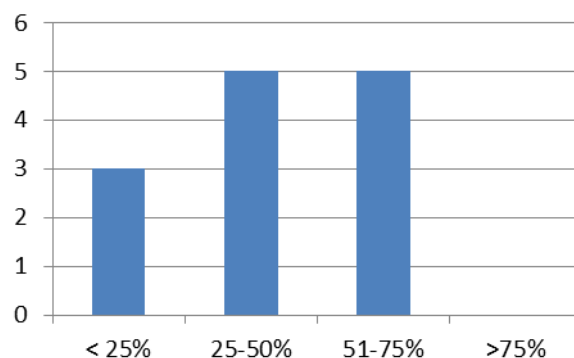
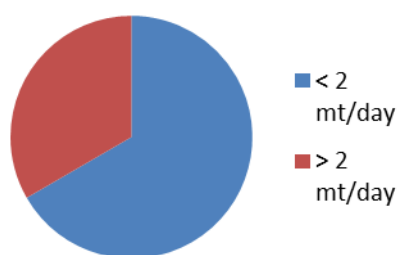
The main challenges farmers reported were lack of inputs (including the high price for fertilizer) and, especially, a lack of improved seed varieties. Surprisingly, lack of technology was not mentioned.

4. Processor characteristics

A total of 15 processors were interviewed during the survey. Seven processors had been in business for more than five years and eight processors less than five years. Two of the processors surveyed had been in business for more than 25 years.



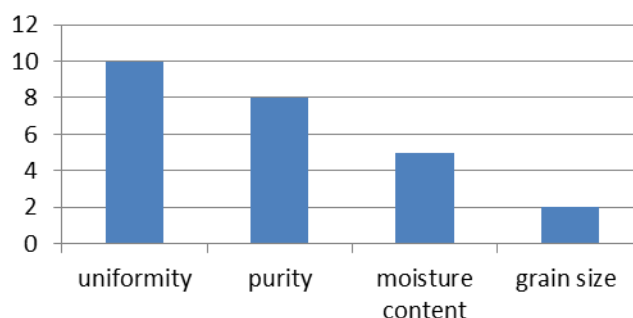
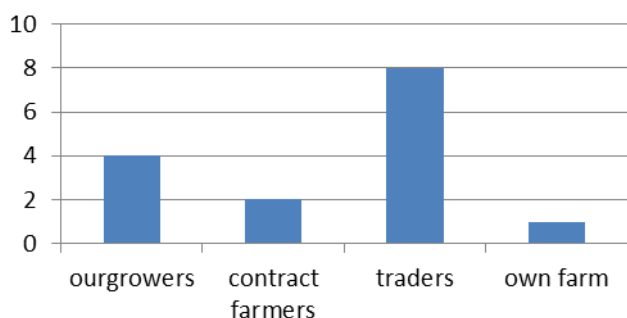
Most of the processors surveyed processed less than 10 mt per day, and all processors operated at less than 75 percent capacity.



Reasons for the capacity utilization were quoted as lack of available paddy all year round, erratic power supply, and poor infrastructure (especially roads).

When asked where the processors source their paddy, most responded that they buy from traders, while a few have out grower schemes or contract farmers.

Regarding quality criteria, uniformity is the most reported criteria followed by purity levels. One will notice that two respondents listed grain size as a criterion for quality. That these were the two integrated rice mills demonstrates that they wish to compete with imported rice.



Chapter C: Choices

At the end of the value chain survey, seven half-day validation workshops were organized. These workshops were attended by 75 value chain stakeholders representing all sectors of the value chain. The workshops were highly interactive with a marked level of participation and lively discussions. Apart from the validation of survey results, stakeholders were asked to formulate strategic priorities which could be used to guide MARKETS II activities during the coming years.

For rice, the following strategic priorities were identified:

Priority	Justification / Business case	Suggested actions	Thematic focus
<ul style="list-style-type: none"> Ensure adequate quantities of all classes of seed (breeder, foundation, and certified) are available. 	<ul style="list-style-type: none"> Nigerian rice will only compete with imports if millers and customers can buy long grain, uniform rice. 	<ul style="list-style-type: none"> Strengthen monitoring and seed production planning Training of public and private sector staff Training of women and youth in community-based seed production Support to improve seed certification and laboratory testing 	<ul style="list-style-type: none"> Inputs Technology Capacity building Youth and gender
<ul style="list-style-type: none"> Support downstream distribution of seeds and other inputs 	<ul style="list-style-type: none"> Private sector is lacking in downstream distribution and inputs, are not available at village level. Farmers do not know where inputs are available 	<ul style="list-style-type: none"> Work with the private sector on innovative distribution models to cover the last mile. Encourage the establishment of public/private sector committees at state level to address distribution issues. 	<ul style="list-style-type: none"> Inputs Technology Capacity building
<ul style="list-style-type: none"> Attract young people to profitable agricultural activities 	<ul style="list-style-type: none"> Youth shy away from farming but could be interested in other value chain activities such as crop spraying, mechanization, processing, transport, and marketing. Youth have little or no access to land. 	<ul style="list-style-type: none"> 'Rebranding' of farming as a profitable business. Organize youth in groups to act as service providers. Help them to develop sustainable business models and facilitate access to finance. Land allocation to youth (groups). Include utilities, ICT and other modern services in a semi-urban setting. 	<ul style="list-style-type: none"> Capacity building Gender and youth Inputs

<ul style="list-style-type: none"> • Promote dry season rice production 	<ul style="list-style-type: none"> • Rice mills have difficulty accessing paddy year round. • Extra income generation for farmers 	<ul style="list-style-type: none"> • Training in irrigated rice farming, especially for women and youth. • Demonstrate small-scale irrigation equipment. • Establish demonstration plots in the Middle Belt. 	<ul style="list-style-type: none"> • Capacity building • Technology deployment • Gender and youth
<ul style="list-style-type: none"> • Support to rice processors 	<ul style="list-style-type: none"> • Nigerian rice processors need to produce high-quality, milled rice to be able to compete with imports 	<ul style="list-style-type: none"> • Improve installed equipment by special NIRSAL funding. • Training of processors and their personnel. • Encourage a better and sustainable relationship between processors and farmers. • Encourage processors to provide mechanization to farmers • Advocate the availability of lower cost diesel to processors and mechanization providers. 	<ul style="list-style-type: none"> • Access to finance • Capacity building • Technology deployment
<ul style="list-style-type: none"> • Support the introduction and local manufacturing of small scale post-harvest equipment 	<ul style="list-style-type: none"> • Many post-harvest operations (threshing, winnowing etc) are carried out manually and are labor intensive. • Post-harvest operations could become income generating activities for women and youth. • Improved post-harvest handling will improve overall rice quality. 	<ul style="list-style-type: none"> • Make an inventory of small scale equipment available in Nigeria or elsewhere. • Showcase the technologies and train farmers in use. • Facilitate access to finance for investment in technologies • Identify local manufacturers. 	<ul style="list-style-type: none"> • Technology development and deployment. • Capacity building. • Access to finance • Gender and youth.

Chapter D: Conclusions and actions

The Nigerian rice value chain is characterized by a large number of small producers on modest land holdings. Growing rice as the main source of income is rare, and most rice farmers cultivate other crops like cassava, yams, melons, plantains, and vegetable crops at the same time.

The level of mechanization for land preparation, harvesting, and post-harvest handling is very low, which leads to high labor costs and poor quality of the harvested rice.

Access to agricultural inputs (including seeds of improved varieties) and finance is low.

There is an emerging rice milling sector with several new rice mills in both the North (Kebbi, Kano, Jigawa) and the Middle Belt (Benue, Ebonyi). All of these mills face similar problems such as high energy costs and the high cost and lack of year-round availability of paddy. Mills must therefore resort to importation of brown (husked) rice in order to keep operating.

The ambitious Agricultural Transformation Agenda launched in May 2012 by the GON looks at making Nigeria self-sufficient in rice by 2015 and supports this by the importation of 100 new rice mills to be operated by the private sector, the formation of farming clusters around these mills for paddy supply, and increased tariffs on imported rice.

During the validation workshop, which was attended by a healthy cross section of value chain actors, several priority actions for MARKETS II interventions were identified.

- Ensure adequate quantities of all classes of seed (breeder, foundation, and certified) are available.
 - o The import substitution strategy espoused by the ATA will only succeed if locally produced rice can compete not only on price but also on quality with imported rice.
 - o The availability of the right varieties in sufficient quantities is crucial and needs a concerted effort from breeders and foundation and certified seed producers. MARKETS II can play an important role in establishing protocols and seed demand forecasting systems by working closely with the National Cereals Research Institute (NCRI), the National Agricultural Seeds Council (NASC), and private-sector seed companies. MARKETS II can also support the seed value chain by providing training to rice seed farmers using an adapted package of practices (POP).⁹ Seed certification and seed testing are weak links in the seed value chain, and MARKETS II could start by making an inventory of existing staff and equipment and suggest ways to remove bottlenecks.
- Support downstream distribution of seeds and other inputs.
 - o Input use by rice farmers is low, resulting in low yields.

Input supply companies have very limited downstream distribution, which limits the availability to farmers. This constraint applies to all value chains we have studied, and MARKETS II could develop ideas for innovative distribution systems that bring inputs in the direct proximity of farmers.¹⁰

- Attract young people to profitable agricultural activities.

⁹ Under BtM2 and MARKETS II, the project supported 90 seed producers on behalf of Notore Fertilizer Company by providing training in seed production.

¹⁰ One example is the farmer dealer concept introduced in the United States in the 1920s, and which still works well. Another example is the village promoter concept being tested by Notore in several states.

- Young people do not see farming as a livelihood option, as returns on labor and investment are slow. Young people, however, could be interested in providing services to farmers such as crop spraying, mechanical harvesting and threshing, and transport, all of which are paid in cash.
- MARKETS II could in collaboration with the GoN, FAO and other agencies facilitate the formation of youth groups to act as service providers to the farming community and provide training based on the POPs and NAEC.¹¹
- Promote dry season rice production.
 - Rice processors see the seasonality of rice production as a constraint to running their mills at capacity year-round. Dry season production in Fadama areas or under irrigation could alleviate this constraint.
 - MARKETS II is already supporting dry season rice production in Kebbi and Sokoto but could extend these activities to the Middle Belt where suitable land is available.
- Support to rice processors.
 - MARKETS II could advocate the use of NIRSAL funds for upgrading existing rice mills. The small rice mills in Abakaliki and other places are more than twenty years old and need upgrading. There is need for destoners and optical sorters to remove stones and discoloured grains in order to make local rice more acceptable to consumers.¹² MARKETS II should facilitate better relationships between farmers and processors. Although thousands of farmers were networked under MARKETS and BtM2, some of these relationships are not yet sustainable, as there is still not enough trust between the parties.
 - At the validation workshop, one rice processor suggested that a processor who offers mechanization to farmers will create stronger links.
 - High energy costs are a constraint for every rice processor. In many developed countries, diesel for agricultural purposes has lower taxes and is therefore substantially cheaper. MARKETS II should consider advocating for this with the relevant authorities.
- Support the introduction and local manufacturing of small scale post-harvest equipment.
 - Currently, use of mechanization is very low in the Nigerian rice sector. Land preparation, harvesting, and threshing are done manually, leading to high labor costs and loss of quality. MARKETS II, in its project proposal, already incorporated several activities in this field and recently signed an Implementation Agreement with NCRI to demonstrate NCRI technologies to MARKETS II farmers and identify local manufacturers. NCRI has developed threshers, winnowers, and parboiling equipment, but there are still many missing technologies such as locally developed and manufactured destoners, mechanical planters, and small equipment for land preparation.
 - One of the activities MARKETS II has proposed is producing an inventory of technologies available both regionally and internationally and make this knowledge widely available through the organization of a mechanization fair.

¹¹ Youth participation in agriculture is an important part of the Agricultural Transformation Agenda and the GON and FAO are jointly working on a concept note.

¹² MARKETS II could look at Ghana, where a destoning and optical sorting platform was built to serve a large group of rice millers.

Annex I: Survey methodology

Timing

The Value Chain Analysis survey for seven commodities was carried out between August 14th and September 7th, 2012. The survey was preceded by a weeklong training on value chain principles, MARKETS II intervention areas, and survey administration. During this period survey questionnaires were developed. Data analysis began on September 10th and continued through October 10th. Seven half day validation workshops were organized between September 17th and 20th and included active participation by of a cross section of the stakeholders interviewed during the survey.

The team

The entire MARKETS II technical team, including subcontractors, participated in the study. Seven senior Nigerian consultants served as value chain team leaders. A total of 25 people were involved in the survey work with administrative and management support from MARKETS II. Two international consultants also assisted a key phases of the process—one for training and start-up and one for data analysis, stakeholder validation and final document preparation.

Value chain teams and states covered

Eleven teams were formed to cover the seven commodities across 20 states. Each team contained at least one female staff member to make sure that gender-sensitive questions could be addressed in mixed or all female focus groups without problems.

Commodity	Number of teams	States
Cassava	1	Oyo, Ondo, Edo, Ogun
Cocoa	2	Cross River, Ondo, Oyo, Osun
Rice	2	Kano, Jigawa, Kebbi, Ebonyi, Anambra, Benue
Sorghum	2	Kano, Katsina, Kaduna
Aquaculture	1	Edo, Osun, Oyo, FCT, Lagos, Ogun
Maize	2	Kaduna, Plateau, Nassarawa
Soybean	1	Nassarawa, Kaduna, Niger, Benue

Target value chain stakeholders

The following stakeholders were targeted:

Producers (small and large scale)
Processors (small and large scale)
Service providers (mechanization, spraying, transporters, etc)
Policy makers (MARD, ADP)
Input dealers
Traders

Survey tools

The teams used both structured key informant interviews and focus group discussions to carry out the research. The table below presents the number of people interviewed through both key informant interviews and focus group discussions.

Commodity	Interviews
Maize	65
Rice	89
Soybean	40
Cocoa	85
Aquaculture	78
Sorghum	89
Cassava ¹³	41

Service providers

All the MARKETS II service providers (5) were subcontracted to assist the value chain teams with setting up meetings with key informants and focus groups and to help with translation where necessary. They were specifically instructed to identify key informants among crop association members, non-associated farmers, marketers, processors, input dealers, extension agents, grain purchasers, women and youth groups, technology and service providers, financial institutions and wholesalers and retailers and to assemble focus groups consisting of male and female farmers, youth, extension agents, small processors, cooperative groups, traders etc. Due to time constraints, it is possible that the selection of producers was skewed towards producers that worked with MARKETS and BtM2 before. The service providers played a key role in the survey process and made rapid progress possible.

Data input and analysis

Data input was done by a team of three people and supervised by a data analyst. Value chain teams sent completed questionnaires on a weekly basis to Abuja so that data input was a continuous process during the survey. However, template development and data input took longer than expected and, in some cases, delayed data analysis.

¹³ The number of actual interviews for cassava is disappointing but can be explained by the fact that it was a single team covering a large area. The same is true for the soybean value chain team.

Annex II: Case Studies – False Bottom Drums and Wet Season Paddy

False Bottom Drums, the Technology of Rice Parboiling among Small Scale Processors.

Stainless Steel False Bottom (SSFB) drums for rice parboiling were designed and locally manufactured under MARKETS in 2009 by Tony Muoneke of Annes Agro Industries in Abakaliki.

Ten drums were fabricated by the innovator, out of which nine were distributed to nine parboilers / processors in Ebonyi state. The drums were intended to increase the volume of paddy parboiled from 250kg to 400kg per batch, reduce time, fuel, and labor used during parboiling, and produce a cleaner product.

From the day these drums were handed over to the benefiting users, some of them were dumped at the sites without being used. In one of the meetings held between the small-scale processors and BtM2, it was agreed that the drums that were not in use should be withdrawn and handed over to others who would utilize them more effectively. This would afford the project the opportunity to fully explore the functionality or non-functionality of the drums in achieving the overall purpose of their fabrication.

From February 28, 2012, through March 1, 2012, BtM2 organized a three-day training for six small-scale processors in Ayamelum, Anambra State, facilitated by Tony Muoneke on the use of these Stainless Steel False Bottom (SSFB) Drums. During the same period, two drums transferred from Abakaliki were handed over to a processor and a contract parboiler in the state, including one Christian Agumadu of Panni Rice Mills, Omor.

Since Christian Agumadu received the drums, his testimonies justify the intention of BtM2 in introducing the technology to small-scale rice processors. He testifies that the training was well packaged, and he was impressed with the standard of the training which exposed him to the functionality of the new drum. According to him, the drum, which he had used over 100 times since the day of collection, saves firewood, gives higher parboiling efficiency, and takes more paddy (400kg) in a parboiling session, compared to 250-300kg under traditional methods. The drum also offers the opportunity of two parboiling sessions in one day.

Comparative analysis of the cost benefit between traditional drums and SFBs for one session of parboiling per day

Activity	Traditional Drum (NGN)	Stainless Steel False Bottom (SFB) Drum (NGN)
Firewood	1400	1000
Water	100	200
Labor	1200	1200
Kerosene	20	20
Total expenses	2720	2420
Income (One session charge)	4000	4000
Benefit	1280	1580
No. of times usable per day	1	2
Grand daily Income	1280	3160

From the above analysis, while the traditional drum provides a single parboiling benefit of NGN1,280 daily, the SFB drum provides a single parboiling session benefit of NGN1,580,

which results in an income advantage of NGN300 per session for the SFB drum. The added advantage of double-session use per day for the SFB drum gives the technology a daily total NGN3,160 income benefit. This equipment, therefore, becomes an income generating facility on a daily basis, giving an expected annual return of NGN910, 080 when used twice daily. Agumadu has asked Muoneke to fabricate more drums for him, as the demand among the former's customers to use the SFB drum has risen, and his customers are now making reservations to use the drum.

Wet season handling of paddy

A typical situation in Wadata, Makurdi, Benue state

Paddy is the raw material used by rice millers to produce finished rice. Processors' demand for paddy depends on the value attached to the commodity, with value being indicated by such characteristics as grain size, moisture content, consumer preference, level of impurity, and ease of milling. Unfortunately, the presentation of premium paddy with impurities and mixed grains remains a challenge in the Nigerian sector. This scenario contributes to the low competitiveness of local rice and drives up consumer preference for imported rice.

In rice processing, there are two major drying operations that are used to reduce moisture content of rice grains to a storable level (between 12 and 13 percent). One occurs after harvest, and the other occurs after parboiling.

The first increases storability of the commodity and avoids fungal infestation that may affect the nutritional quality of the grains as well as their physical coloration after processing. If the paddy is not properly dried, it can germinate, which may also affect the quality and the marketability of the commodity. Most Nigerian grown rice is parboiled to harden the kernel, and dried after parboiling and before packing to reduce losses due to infestation or fungus.

These two distinct drying activities have always been a challenge to local producers and small-scale rice processors nationwide. Farmers and processors normally spread their grains after harvesting or parboiling on the roads, since they do not have dedicated drying platforms. This exposes the rice to contamination from stones and dirt, animal droppings, and other foreign bodies on the ground. Whenever rain clouds gather, there is a rush to gather the rice, and in the process, all kinds of dirt and foreign materials are swept and scooped along with the rice into sacks and other containers.

In the Wadata area of Makurdi in Benue State, where over 80 percent of small-scale rice processors are women, the case is not different. The women, like other processors in Nigeria, see the non-availability of concrete slabs or raised rice drying platforms as a constraint. Although dedicated platforms, may reduce the amount of stone and dirt that can be picked up, they do not keep the rains away.

This, therefore, creates a gap in the rice value chain in the effort to improve the quality of local rice production. There is an urgent need to address this situation by making affordable, durable dryers available to these farmers and processors. When asked if they knew about dryers, farmers and processors claimed they had not heard of them but were excited to know that such devices exist.

There are several economic benefits which can be derived from using mechanical dryers or other technologies to dry rice. These include an increased market value of the higher quality product, more secure income from reduced weather risks, and the ability to process more grain in a given amount of time.

Rice drying technologies and opportunities

Simple dryers or drying technologies have been developed by IRRI and locally in Nigeria by NCRI. The IRRI flatbed dryer and the similar Vietnamese flatbed (VFB) dryer cost upwards of \$1,000 and \$1,500, respectively. IRRI's flatbed dryer can process one ton in six-to-eight hours; whereas, the VFB dryer has the capacity to dry four-to-eight tons of rice in the same amount of time. The Philippines-based company GrainPro has also developed collapsible drying bags made out of woven and coated PE that can be zipped up simply when rain threatens. Regrettably these technologies are not being put into use by small-scale operators in Nigeria.

Lack of adoption could be attributed to a lack of awareness on the part of farmers and processors, or a lack of capital to buy the equipment, or a lack of commitment to agriculture on the part of government agencies and private investors in the sector. And, where rice dryers have been available, as in the case of the locally fabricated rice dryers from the National Cereals Research Institute (NCRI) in Niger state, the dryers have been reported by the News Agency of Nigeria to be rusting away from lack of use. There is a critical opportunities for MARKETS II to partner with NCRI in technology development and transfer to improve rice production and processing through appropriate technologies.

Annex III: Source of growth

Resources account for the majority of growth in many of Africa's oil exporters, although Nigeria is more diversified

Real GDP growth by industry sector, 2002–07
%, 2000 \$ billion

